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Description

The present invention relates generally to a drill. More particularly, a design of drills for drilling reinforced concrete, rock or the like and a drilling method for using the same is proposed.

Diamond core bits are generally known for drilling the above types of materials. Such diamond bits usually have an adapter connected to and rotating integrally with a drive shaft of an electric motor, a cylindrical body attached to the tip of the adapter, and an annular bit attached to the tip of the body. A multiplicity of diamond segments are fixed to the tip surface of the bit. There is also a type wherein the body and the bit are integrally formed. The diamond core bits having the foregoing designs can drill a desired portion of, by way of example, a reinforced concrete building and can cut a deep hole therein.

However, when a deep hole is to be made into a concrete building or the like with the foregoing diamond core bit, debris due to drilling remains around the diamond segments and increases the drilling resistance. As a result, the drilling efficiency of the diamond core bit deterioratates.

In order to solve the above problem, double cylinder type drills have been proposed. The double cylinder type drill has a body comprised of a shank and a sleeve fixed to the shank. In this type of the drill, compressed air is supplied to a passage formed between the shank and the sleeve. The compressed air is sprayed upon the debris, which is then sucked and discharged through the inside of the drill by means of an aspirator.

In the foregoing double cylinder type drill, the passage for the compressed air must be provided at the adapter and between the shank and the sleeve. However, the shape and the location of the passages in conventional double cylinder type drill tend to be inefficient and make the sleeve difficult to assemble. Therefore, conventional double cylindrical type drils require a long and complicated manufacturing process which leads to high production costs.

When the foregoing double cylindrical type drill is at work and comes into contact with a reinforcing bar for instance, there is also another problem that the self-sharpening effect of the drill bit deteriorates. The self-sharpening effect here means as follows. When abrasive grains forming the diamond segments are abraded, a higher drilling resistance comes about upon the abrasive grains. Thus, a part of the abrasive grains is broken due to the increased resistance. However, the broken part has sharpness and can work as an effective cutting edge. It is called the self-sharpening effect. When the self-sharpening effect is lowered, it takes an extended time to drill and cut the reinforcing bars. In some cases, it may become impossible to drill them.

Russian patent SU-A-81759 discloses an annular diamond drill having a lower part comprising a stepped body with a blind central hole, and two groups of through holes.

Russian patent SU-A-818372 and German patent DE-B-1130255 each disclose similar drills in which annular abrasives are supplied to a drilling portion from outside the drill by utilising the suction used to remove the debris.

A primary object of the present invention is to provide.a double cylinder type drill that can be manufactured simply at a low cost.

Another object of the present invention is to provide a drill which allows for self-sharpening of the cutting teeth when the cutting edges come into contact with a hard material such as reinforcing bars, so that the reinforcing bars or the like can also be smoothly drilled or cut.

To achieve the foregoing and other objects and in accordance with the purpose of the present invention, an improved drill is proposed. According to the present invention, the drill has an adapter connected to and can rotate with a drive shaft of an electric motor, a shank is attached to the adapter, a fluid supply line is formed at the adapter, a sleeve covers and is fixed to the shank. A plurality of cutting teeth are provided at the tip of the shank or of the sleeve. A groove is formed on an outer periphery of the adapter, the fluid supply line leads a fluid supplied from a proximal side of the adapter to the groove. An inlet port is provided at a proximal end of the shank corresponding to the groove and communicates with the inside and outside of the shank. A guide flute is provided at an outer periphery of the shank and extends from the inlet port to a tip of the shank. Said flute defines a passage between the shank and the sleeve. Said passage leads the fluid introduced from the inlet port to the tip of the shank so as to spray the fluid upon cutting debris. The adapter includes an exhaust port for discharging the debris and an exhaust passage leading the debris through the shank to the exhaust port.

The features of the present invention are set forth in the appended claims. The invention, together with the objects and advantages thereof, may best be understood by reference to the following description of the presently preferred embodiments together with the accompanying drawings in which:

FIGURE 1 is a sectional view of a drill of one embodiment of the present invention wherein one part of the shank and sleeve is omitted.

FIGURE 2 is an exploded perspective view of the drill shown in Figure 1.

FIGURE 3 is an enlarged sectional view highlighting the connection between an attachment portion of the shank and the adapter.

FIGURE 4 is an enlarged sectional view of the tips of the shank and of the sleeve.

FIGURE 5 is a sectional view taken along with a line V-V in Figure 1.

FIGURE 6 is a partial sectional view of an adapter of another embodiment.

As illustrated in the drawings, a preferred embodiment of the present invention will be described in detail hereinafter.

As shown in Figures 1 and 2, the drill of the present embodiment includes an adapter 1 fitted to an electric motor 3, a shank 22 attached to the tip of the adapter 1, and a sleeve 29 covering and fixed to the outer periphery of the shank 22. A plurality of cutting teeth 26 are fixed to the tip of the shank 22. The adapter 1, the shank 22, and the sleeve 29 are integrally rotated by the motor 3. When rotated, the cutting teeth 29 can drill into a material such as a concrete 51. Each of the foregoing parts will be explained one by one below.

ADAPTER 1:

A tapped hole 2 is formed in the proximal end of adapter 1 such that it open at the adapter's a proximal surface (the right end surface in Figure 1). A drive shaft 4 of the motor 3 is screwed into the tapped hole 2. A primary swivel joint 5 is supported on the drive shaft 4 and can rotate relative to the drive shaft 4. Compressed air 40 is supplied from the outside of the primary swivel joint 5. The compressed air is introduced through the inside of the drive shaft 4 into the tapped hole 2.

A plurality (three in this embodiment, refer to Figure 5) of small bore holes 6 are provided at an inner bottom surface of the tapped hole 2. The small bore holes are arranged having an equal angle distance around an axis of the drive shaft 4 and extend in the axial direction toward the tip of the adapter 1. The small bore holes 6 open at the tip surface of the adapter 1 and are closed by screws 7. As shown in Figures 1 and 3, an opening 8 is provided at each small bore hole 6 and extends outwardly in the diametrical direction of the adapter 1. The opening 8 open at a groove 9 defined at the outer periphery of the adapter 1. In this embodiment, the tapped hole 2, the small bore holes 6 and the openings 8 compose a fluid supply line 11 which leads the compressed air 40 supplied from the proximal side of the adapter 1 to the groove 9.

As shown in Figure 1, a large bore hole 12 is defined at substantially a middle portion of the adapter 1, opening at the tip surface of the adapter 1 and extending in the axial direction toward the proximal side of the adapter 1. A plurality of (three in this embodiment) openings 13 are provided at an inner end of the large bore hole 12, having an equal angle distance between one another and extending outwardly in the diametrical direction of the adapter 1. The openings 13 open at a peripheral surface of the adapter 1 to form exhaust ports 14. In the present embodiment, the large bore hole 12 and the openings 13 compose exhaust passages 15 which lead the debris to the exhaust ports 14.

A secondary swivel joint 16 is supported on and can rotate relative to the periphery of the adapter 1. The secondary swivel joint 16 covers all of the exhaust ports 14. A suction pipe 18 is connected to the secondary swivel joint 16 by way of a connector 17. An aspirator (not shown) is connected to the suction pipe 18. Upon operation of the aspirator, the debris is sucked through the exhaust passage 15, the secondary swivel joint 16, the connector 17 and the suction pipe 18 to be discharged out of the adapter 1.

A flange 19 is formed integrally with the outer periphery of the adapter 1 near the exhaust ports 14. A stopper 20 is threadably engaged with the periphery of the adapter 1 adjacent to the proximal end of the opening 13. The flange 19 and the stopper 20 prevent the secondary swivel joint 16 from moving in the axial direction.

A male thread 21 is formed on the periphery of the adapter 1 between the flange 19 and the groove 9. A proximal portion of the shank 22 has a female thread that engages the male thread 21. The periphery of the adapter 1 has an O-ring 23 thereon at the distal side thereof relative to the groove 9 to seal the adapter 1 and the shank 22.

SHANK 22 :

As shown in Figures 1 and 2, the shank 22 is cylindrical with both ends thereof being open. A flange 22a and a weldment 22b are both formed at each end of the shank 22 having a body portion 22c therebetween. A female thread 24 to fit the male thread 21 is formed at the inner surface of the flange 22a. A plurality of (eight in the present embodiment) notches 25 are defined at the tip surface of the weldment 22b. The notches are spaced equal distances apart and extend toward the proximal side of the shank 22. A cutting tooth 26 is fixed to the tip surface of the weldment 22b between each pair of adjacent notches 25 by brazing or the like.

A plurality of (four in the present embodiment) inlet ports 24 are provided at the proximal portion of the shank 22. The inlet ports are spaced at equal intervals and communicate between the inside and the outside of the shank 22. When the shank 22 is screwed and fitted to the adapater 1, the inlet ports 24 are positioned adjacent the groove 9 of the adapter 1. Guide flutes 28 having a depth of 0.4 - 0.5 mm are formed on the outer periphery of the shank 22 and extend in the axial direction from the inlet ports 27 to notches 25.

SLEEVE :

The sleeve 29 covers and is fitted to the outer periphery of the body portion 22c of the shank 22.

The sleeve 29 has substantially a cylindrical shape and a little smaller diameter than that of the body portion 22c of the shank 22. A linear slit 30 is formed at the sleeve 29, extending in the axial direction thereof. The slit 30 allows the diameter of the sleeve 29 to be expanded or contracted. When the diameter of the sleeve 29 is made larger to fit and cover the body portion 22c, the elastic restoring force of the sleeve 29 makes itself closely fit the body portion 22c. Thus, the sleeve 29 is welded to the shank 22 without overlapping the slit 30 and the guide flutes 28.

Accordingly, when the sleeve 29 is fitted and fixed to the shank 22, a passage 50 is formed between the inner periphery of the sleeve 29 and the guide flutes 28 of the shank 22. The passage 50 leads the compressed air coming from the openings 8 to the cutting teeth 26.

MANUFACTURING OF THE SHANK 22

Manufacturing and assembly of the shank 22 and the sleeve 29 having the foregoing designs are described hereinafter. A cylindrical metallic material is prepared. The body portion 22c and the female thread 24 are formed on the material by means of a lathe. The notches 25 are formed by means of a milling machine. A plurality of (four in this case) inlet ports 27 are defined at predetermined positions by means of a drilling machine. The guide flutes 28 extending in the axial direction from the inlet ports 27 are formed with 0.4 - 0.5 mm depth by means of the milling machine. Thus, the desirable shank 22 can be produced.

MANUFACTURING OF THE SLEEVE 29

A thin plate metallic material of about 0.5 mm is rolled, or the slit is formed on a thin metallic pipe in the axial direction thereof. Thus, the desirable sleeve 29 can be achieved.

ASSEMBLING THE SLEEVE 29 TO THE SHANK 22

The body portion 22c of the shank 22 is covered by the sleeve 29 without overlapping the slit 30 and the guide flutes 28. The sleeve 29 is fixed to the shank 22 by means of spot welding to be integral therewith.

In order to form the passages 50, it is also possible to form similar guide flutes at the inner periphery of the sleeve 29 and thus form passages between the guide flutes and the outer periphery of the shank 22. However, when the passages are formed in this way, the guide flutes must be formed by means of broaching or drawing or the like. This type of processing would require extensive time and result in high production costs.

However, in the present embodiment as described above, the guide flutes 28 are formed on the outer periphery of the shank 22. Therefore, the passages 50 can be provided in the simple steps as explained above. Thus, the production cost can be lowered.

The openings 8 could also be formed at the proximal side of the adapter relative to the male thread 21. If the openings 8 are formed in such a way, the openings 8 and the groove 9 are separated from each other by the screwed portion of the adapter 1 and the shank 22. With this arrangement, a fluid passage for the compressed air 40 has to be provided between the openings 8 and the groove 9. Therefore, grooves crossing the male thread 21 and the female thread 24 must be provided. Forming these kind of grooves requires extra time.

In the present embodiment however, the openings 8 are disposed at the tip side of the adapter 1 relative to the male thread 21. Accordingly, a part of the male thread 21 and of the female thread 24 does not have to be processed to form the grooves, resulting in a simple production procedure.

In order to assemble the sleeve 29 to the shank 22, it is also possible to utilize the sleeve 29 having a diameter larger than that of the shank 22 without the slit 30 and to fix such sleeve 29 the shank 22 by means fo shrinkage fitting or spot welding. However, in this way, it is difficult to accurately form passages at predetermined positions between the sleeve 29 and the shank 22. Moreover, it is possible to form the sleeve with a plurality of segments having guide flutes and to fix these segments to the outer periphery of the shank 22. However, it requires a large number of parts and a complicated assembling procedure.

In the present embodiment, the sleeve 29 has a diameter smaller than that of the shank 22 and includes a slit 30 thereon, so that the elastic restoring force of the sleeve 29 itself makes the sleeve 29 closely fit the shank 22. Thus, the only requirement for assembling the shank 22 and the sleeve 29 in this embodiment is to cover the shank 22 with the sleeve 29 and to fix them together by means of spot welding. It is very simple and still can form the passages 50 of the desirable shape and location between the guide flutes 8 and the inner periphery of the sleeve 29. In addition, the sleeve 29 can be made of a single part and the manufacturing of the sleeve 29 is very simple and easy.

In the described drill arrangement of the present invention, the adapter 1, the shank 22 and the sleeve 29 and fixing of the sleeve 29 to the shank 22 can all be manufactured much more easily than the conventional drills. Consequently, the production cost of the drill can be lowered.

A method for drilling by using the foregoing drill is now described with reference to Figure 1. Upon drilling, the drill is rotated by the motor 3 and the cut-

ting teeth 26 are pressed against the concrete 51. The concrete 51 is cut by the cutting teeth 26 thereby generating debris 54 around the cutting teeth 26.

Then, compressed air 40 is supplied from the outside of the primary swivel joint 5 and the aspirator is driven to suck the air inside the drill out the secondary swivel joint 16. Thus, the compressed air 40 goes through the drive shaft 4 of the motor 3, the tapped hole 2, the small bore holes 6, the openings 8 and the groove 9 to the inlet ports 27 of the shank 22. Then, the compressed air 40 passes through the passages 50 between the guide flutes 28 and the inner periphery of the sleeve 20 and is sprayed to the cutting teeth side.

At this time, the air in the shank 22 is sucked by the aspirator and the air pressure is decreased in the shank 22, so that the debris 54 together with the air outside the concrete 51 goes through the inside of the shank 22, the large bore hole 12, the openings 13, the secondary swivel joint 16 and the connector 17 into the suction pipe 18. Therefore, the debris 54 will not remain in the hole in the concrete 51 and is collected by the aspirator. Thus, the debris 54 does not obstruct drilling.

Upon drilling, when the cutting teeth 26 come to contact with the reinforcing bar 53 embedded in the concrete 51, silica sands 52 as granular abrasives are supplied to the drilling area from the outside of the drill. The silica sands 52 are composed of quartz sands including a large amount of silica (SiO_2), having transparent white color or gray color and a good abrasion resistance.

When drilling, a strong air stream occurs, going from the outside of the sleeve 29 to the inside of the shank 22 via the drilling hole. The silica sands 52 move together with the air stream. When the cutting teeth 26 cut the reinforcing bar 53, the silica sands 52 pass through the cutting teeth 26 led by the air stream. Thus, the silica sands 52 abrade the cutting teeth 26 to promote the self-sharpening effect of the cutting teeth 26.

Therefore, in the present embodiment, the drilling ability of the cutting teeth 26 can be always kept in a good condition by adding the silica sands 52, so that the reinforcing bars 53 can be easily cut.

The shape of the adapter 1 can be modified as shown in Figure 6 according to the diameters of the shank 22 and of the sleeve 29. The proximal portion (right side in Figure 6) of the modified adapter 1 relative to the flange 19 has the same shape as that of the adapter 1 of the foregoing embodiment. However, the tip portion of the modified adapter 1 relative to the flange 19 is defined as a large diametrical portion 32. In addition, a substantially cylindrical auxialiary member 31 is fitted into the large diametrical portion 32. A passage 34 is disposed betwen the inner surface of the large dimetrical portion 32 and the auxiliary member 31 so as to lead the compressed air 40 from the small bore hole 6 to the openings 8.

In this way, the present embodiment can have the same operations and effects as the foregoing embodiment, and the secondary swivel joint 16 can also be used in the present embodiment without modification. The added weight due to the auxialiary member 31 can be very little, too.

As the fluid, the liquid can be used. In this case, the pressure of the liquid can discharge the debris, so that the suction by the aspirator is not necessary. Moreover, the any number of the small bore holes 6, the openings 8 and 13, the inlet ports 27, the guide flutes 28 and the cutting teeth 26 may be changed to any appropriate number.

Instead of the O-ring 23 used in the foregoing embodiment, a V-ring 35 shown in Figure 6 can be used. The drill and the method for using the same can be used for drilling rock or the like.

As the abrasives 52, diamonds, corundum (Al_2O_3), emery, garnet, flint, silicon carbide, boron carbide, chromium oxide, iron oxide or the like can be impregnated into the cutting teeth 26. It is desirable to choose the proper hardness and granular size of the abrasives according to the materials of the cutting teeth 26.

In addition, a plurality of cutting teeth can be disposed at the tip of the sleeve 29 instead of at the tip of the shank 22. Although only a few embodiments of the present invention have been described herein, it should be apparent to those skilled in the art that the present invention may be embodied in many other specific forms without departing from the scope of the appended claims. Therefore, the present examples and embodiments are to be considered as illustrative and not restrictive and the invention is not to be limited to the details given herein, but may be modified within the scope of the appended claims.

Claims

1. A drill wherein an adapter (1) is connected to and can rotate with a drive shaft (4) of an electric motor (3), a shank (22) is attached to the adapter (1), a fluid supply line (11) is formed at the adapter (1), a sleeve (29) covers and is fixed to the shank (22), and a plurality of cutting teeth (26) are provided at a tip either of the shank (22) or of the sleeve (29); characterized by that

   a groove (9) is formed on an outer periphery of the adapter (1), the fluid supply line (11) leads fluid supplied from a proximal side of the adapter (1) to the groove (9), an inlet port (27) is provided at a proximal end of the shank (22) corresponding to the groove (9) and communicates with the inside and outside of the shank (22), a guide flute (28) is provided at an outer periphery of the shank (22) and extends from the inlet port

(27) to a tip of the shank (22), said flute (28) defines a passage (50) between the shank (22) and the sleeve (29), said passage (50) leads the fluid introduced from the inlet port (27) to the tip of the shank (22) so as to spray the fluid upon cutting debris, and said adapter includes an exhaust port (14) for discharging the debris and an exhaust passage (15) leading the debris through the shank (22) to the exhaust port (14).

2. A drill as set forth in Claim 1 wherein said guide flute (28) is formed by processing the outer periphery of the shank (22) with a milling machine.

3. A drill as set forth in Claim 1 wherein the proximal end of the shank (22) is screwed into the tip of the adapter (1), the groove (9) is provided at the outer periphery of the adapter (1) at the tip side thereof relative to the screwed portion, and the fluid supply line (11) opens at the groove (9).

4. A drill as set forth in Claim 1 wherein the sleeve (29) has a diameter smaller than that of the shank (22), and a slit (30) is formed on the sleeve (29) and extends in the axial direction thereof.

5. A drill as set forth in Claim 4 wherein the sleeve (29) is made by rolling a thin plate material.

6. A drill as set forth in Claim 4 wherein the sleeve (29) covers the shank (22) and is welded to the shank (22) at the slit (30).

7. A drill as set forth in Claim 1 wherein a substantially cylindrical auxiliary member is attached in the adapter (1), an auxiliary passage is defined between the adapter (1) and the auxiliary member so as to lead the fluid to the groove provided on the outer periphery of the adapter (1).

Patentansprüche

1. Hohlbohrer, bei welchem ein Adapter (1) mit einer Antriebswelle (4) eines Elektromotors (3) verbunden und mit dieser verdrehbar ist, wobei ein Schaft (22) an dem Adapter (1) befestigt, eine Strömungsmittel-Zuführleitung (11) am Adapter (1) ausgebildet ist, eine Hülse (29) den Schaft (22) bedeckt und an diesem befestigt ist und wobei eine Mehrzahl von Schneidzähnen (26) an der Spitze entweder des Schaftes (22) oder der Hülse (29) vorgesehen ist, dadurch gekennzeichnet,
daß eine Nut (9) am Außenumfang des Adapters (1) ausgeformt ist, daß die Strömungsmittel-Zuführleitung (11) das von einer proximalen Seite des Adapters (1) zugeführte Strömungsmittel zu der Nut (9) leitet, daß eine Einlaßöffnung (27) an dem proximalen Ende des Schaftes (22) vorgesehen ist, welches der Nut (9) entspricht, und mit der Innen- und Außenseite des Schafts (22) kommuniziert, daß eine Führungsrille (28) am Außenumfang des Schaftes (22) vorgesehen ist und von der Einlaßöffnung (27) zur Spitze des Schafts (22) verläuft und einen Kanal (50) zwischen dem Schaft (22) und der Hülse (29) bildet, wobei der Kanal (50) das an der Einlaßöffnung (27) eingeführte Strömungsmittel zur Spitze des Schaftes (22) leitet, so daß das Strömungsmittel auf das Bohrmehl gesprüht wird, und daß der Adapter (1) eine Auslaßöffnung (14) enthält, über welche das Bohrmehl abgegeben wird, sowie einen Auslaßkanal (15), welcher das Bohrmehl durch den Schaft (22) zur Auslaßöffnung (14) leitet.

2. Hohlbohrer nach Anspruch 1, dadurch gekennzeichnet,
daß die Führungsrille (28) durch Bearbeitung des Außenumfanges des Schaftes (22) mit einer Fräsmaschine geformt ist.

3. Hohlbohrer nach Anspruch 1, dadurch gekennzeichnet,
daß das proximale Ende des Schaftes (22) in die Spitze des Adapters (1) eingeschraubt ist, daß die Nut (9) am Außenumfang des Adapters (1) und zwar bezogen auf den Gewindeabschnitt auf der der Spitze zugewandten Seite vorgesehen ist und daß die Strömungsmittel-Zuführleitung (11) sich in die Nut (9) öffnet.

4. Hohlbohrer nach Anspruch 1, dadurch gekennzeichnet,
daß der Durchmesser der Hülse (29) kleiner als derjenige des Schaftes (22) ist und daß ein Schlitz (30) an der Hülse (29) ausgebildet ist und sich in deren Axialrichtung erstreckt.

5. Hohlbohrer nach Anspruch 4, dadurch gekennzeichnet,
daß die Hülse (29) durch Rollen eines dünnen Bleches hergestellt ist.

6. Hohlbohrer nach Anspruch 4, dadurch gekennzeichnet,
daß die Hülse (29) den Schaft (22) bedeckt und am Schlitz (30) an dem Schaft (22) angeschweißt ist.

7. Hohlbohrer nach Anspruch 1, dadurch gekennzeichnet,
daß ein im wesentlichen zylindrisches Hilfsteil im Adapter (1) befestigt ist, wobei ein Hilfskanal zwischen dem Adapter (1) und dem

Hilfsteil derart ausgebildet ist, daß er das Strömungsmittel zu der am Außenumfang des Adapters (1) vorgesehenen Nut leitet.

Revendications

1. Foret dans lequel un adaptateur (1) est connecté à et peut tourner avec un arbre moteur (4) d'un moteur électrique (3), une tige (22) est attachée à l'adaptateur (1), un canal d'alimentation en fluide (11) est formé dans l'adaptateur (1), une douille (29) couvre et est fixée à la tige (22), et une pluralité de dents coupantes (26) sont réalisées à une extrémité soit de la tige (22) soit de la douille (29),

   caractérisé en ce qu'une rainure (9) est formée sur une périphérie externe de l'adaptateur (1), le canal d'alimentation en fluide (11) conduisant le fluide d'un côté proximal de l'adaptateur (1) jusqu'à la rainure (9), un orifice d'entrée (27) étant réalisé à une extrémité proximale de la tige (22) correspondant à la rainure (9) et communicant avec l'intérieur et l'extérieur de la tige (22), une cannelure (28) étant réalisée à une périphérie externe de la tige (22) et s'étendant à partir de l'orifice d'entrée (27) vers une extrémité de la tige (22), ladite cannelure (28) définissant un passage (50) entre la tige (22) et la douille (29), ledit passage (50) conduisant le fluide introduit de l'orifice d'entrée vers l'extrémité de la tige (22) de façon à diffuser le fluide sur les débris de coupe, et ledit adaptateur (1) comprenant un orifice de sortie (14) permettant de décharger les débris et un passage de sortie (15) conduisant les débris à travers la tige (22) vers l'orifice de sortie (14).

2. Foret selon la revendication 1 dans lequel ladite cannelure (28) est formée par traitement de la périphérie externe de la tige (22) avec une fraiseuse.

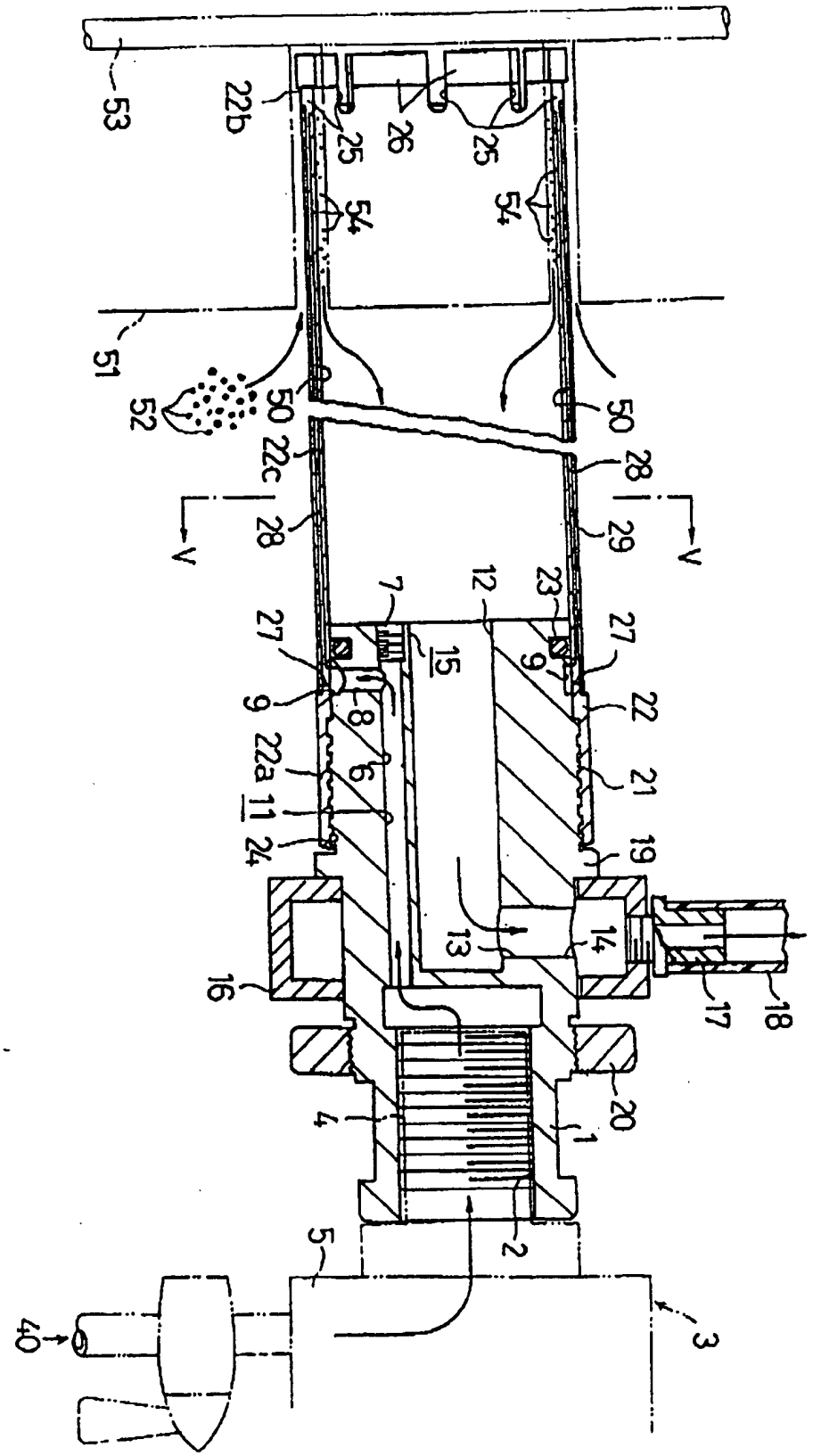
3. Foret selon la revendication 1 dans lequel ladite extrémité proximale de la tige (22) est vissée dans l'extrémité de l'adaptateur (1), la cannelure (9) étant réalisée à la périphérie externe de l'adaptateur (1), à l'extrémité de celui-ci relative à la portion vissée, et le canal d'alimentation en fluide (11) s'ouvrant sur la rainure (9).

4. Foret selon la revendication 1 dans lequel ladite douille (29) possède un diamètre plus petit que celui-ci de la tige (22), et une fente (30) étant réalisée sur la douille (29) et s'étendant dans la direction axiale de celle-ci.

5. Foret selon la revendication 4 dans lequel ladite douille (29) est fabriquée par roulage d'une fine matière plastique.

6. Foret selon la revendication 4 dans lequel ladite douille (29) couvre la tige et est unie à la tige (22) par la fente (30).

7. Foret selon la revendication 1 dans lequel un élément auxiliaire substantiellement cylindrique est fixé dans l'adaptateur (1), un passage auxiliaire étant défini entre l'adaptateur (1) et l'élément auxiliaire de façon à conduire le fluide vers la rainure réalisée sur la périphérie externe de l'adaptateur (1).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22b
25
26
25
54
54
51
52
50
50
22c
28
28
29
V
V
7
12
23
27
27
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9
9
8
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22a
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40

Fig.1

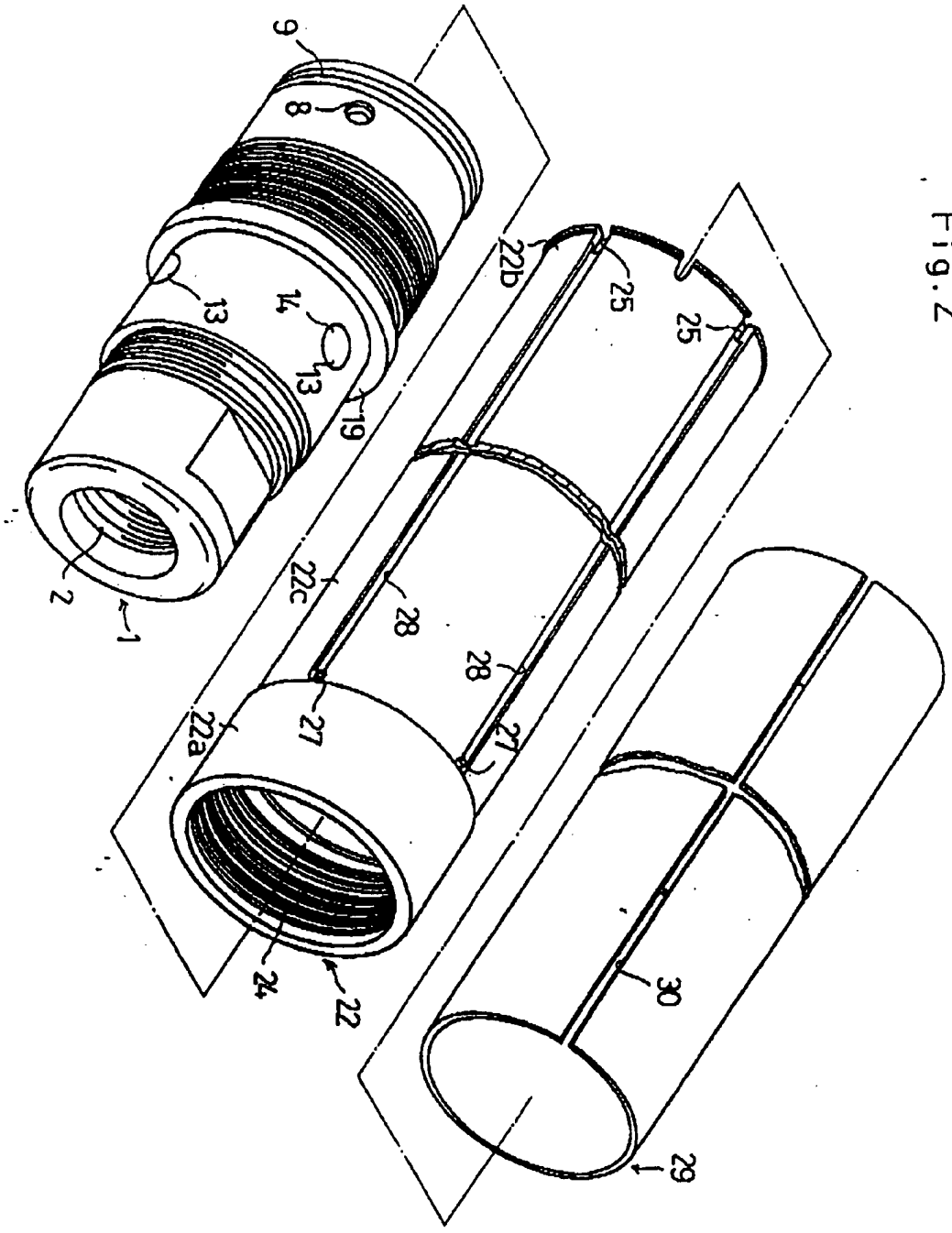

Fig. 2

Fig.3

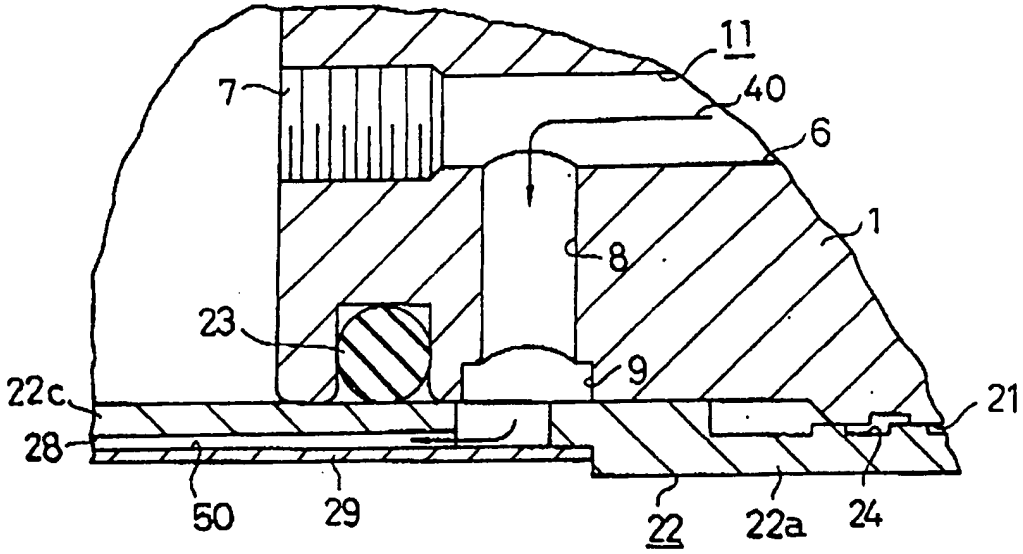

Fig.4

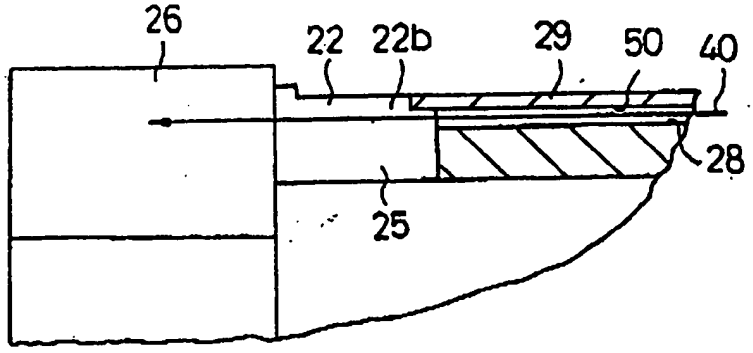

Fig.5

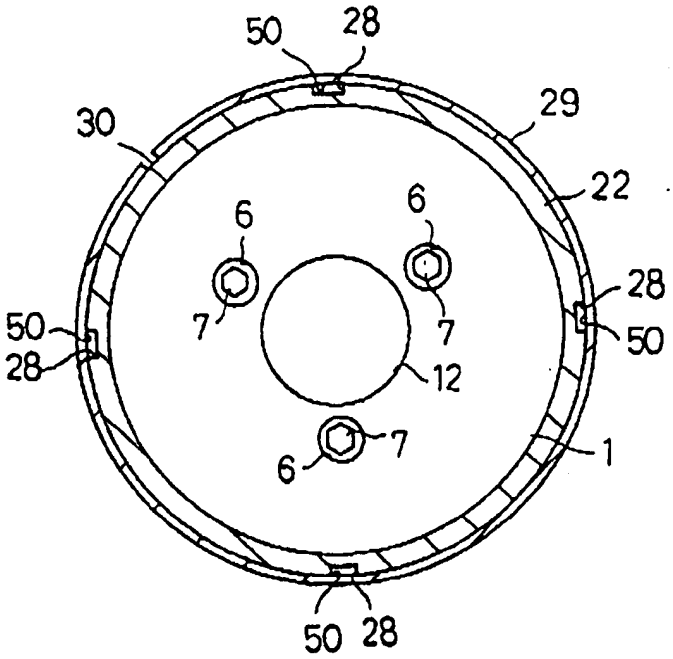
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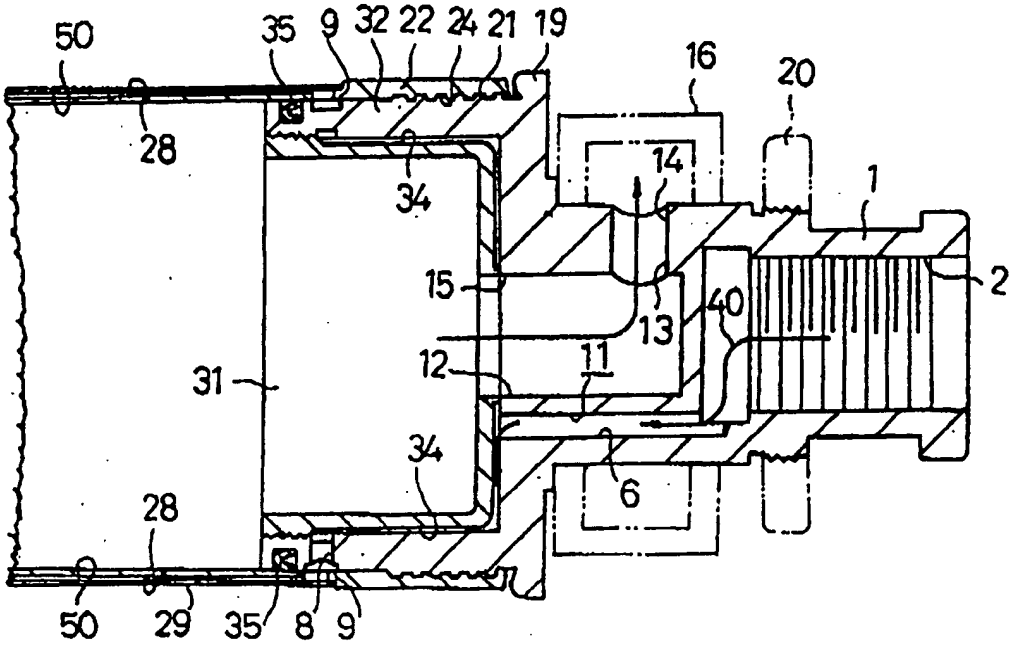
Fig.6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